

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application

Inventor(s): Christophe Pierrat and Michel Côté

Appl. No.: 09/932,239

Confirm. No.: 4845

Filed: 17 August 2001

Title: Phase Conflict Resolution for Photolithographic Masks

Art Unit: 1756

Examiner: Unassigned

Customer No. 30437

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INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. §1.56

Commissioner of Patents
Washington, DC 20231

Sir:

It is requested that the information identified in this statement be considered by the Examiner and made of record in the above-identified application. This statement is not intended to represent that a search has been made or that the information cited in the statement is, or is considered to be, material to patentability as defined in 37 C.F.R. §1.56. If this is a continuation, divisional or continuation-in-part application, it is understood that the Examiner will consider all information which was considered by the Office in a parent application. MPEP §609. Such information therefore is not listed herein unless it is desired that the information be printed on a patent issuing from the subject application.

Enclosed with this statement are the following:

- ✓ Form PTO-1449. The Examiner is requested to initial the form and return it to the undersigned in accordance with M.P.E.P. §609.
- ✓ A copy of each cited document as required by 37 C.F.R. §1.98. Copies are not submitted of documents previously submitted by the applicant in a parent application from which benefit under 35 U.S.C. §120 is claimed, 37 C.F.R. §1.98(d)(1), with an information disclosure statement submitted in the parent application which complies with the Sept. 8, 2000 or subsequent revision of 37 C.F.R. §1.98(a-c). If any of the cited/submitted documents is in a foreign language, a concise explanation of relevance is provided pursuant to 37 C.F.R. §1.98(a)(3)(i). For foreign language documents cited in a search report by a foreign patent office, the requirement for a concise explanation of relevance is satisfied by the submission herewith of an English language version of the search report. MPEP §609A(3). If a written English-language translation of a non-English language document, or portion thereof, is within the possession, custody or control of, or is readily available to any individual designated in §1.56(c), a copy of the translation accompanies this statement, 37 C.F.R. §1.98(a)(3)(ii), and satisfies the requirement for a concise explanation of relevance, MPEP §609A(3).

— **PTA Statement under 37 C.F.R. §704(d).** Each item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in §1.56(c) more than thirty days prior to the filing of the information disclosure statement.

This statement should be considered because:

☒ **37 C.F.R. §1.97(b).** This statement qualifies under 37 C.F.R. §1.97, subsection (b) because:

- (1) It is being filed within three months of the filing date of an application other than a continued prosecution application under § 1.53(d);
-- OR --
- (2) It is being filed within 3 months of entry of a national stage;
-- OR --
- (3) It is being filed before the mailing date of the first Office Action on the merits,
-- OR --
- (4) It is being filed before the mailing date of the first Office Action after the filing of a Request for Continued Examination under 37 C.F.R. §1.114.

— **37 C.F.R. §1.97(c).** Although it may not qualify under subsection (b), this statement qualifies under 37 C.F.R. §1.97, subsection (c) because:

- (1) It is being filed before the mailing date of a FINAL office action, a Notice of Allowance, or an action that otherwise closes prosecution in the subject application, whichever occurs first.

-- AND (check at least one of the following) --

- (1) It is accompanied by a STATEMENT as set forth in 37 C.F.R. §1.97(e).
-- OR --
- (2) It is accompanied by the \$180 fee set forth in 37 C.F.R. §1.17(p).

— **37 C.F.R. §1.97(d).** Although it may not qualify under subsection (b) or (c), this statement qualifies under 37 C.F.R. §1.97, subsection (d) because:

- (1) It is being filed on or before payment of the issue fee;
-- AND --
- (2) It is accompanied by a STATEMENT as set forth in 37 C.F.R. §1.97(e);
-- AND --
- (3) It is accompanied by the \$180 fee set forth in 37 C.F.R. §1.17(p).

Application No. 09/932,239

☒ **Fee Authorization.** The Commissioner is hereby authorized to charge underpayment of any additional fees or credit any overpayment associated with this communication to Deposit Account No. 50-0869. A duplicate copy of this authorization is enclosed.

Respectfully submitted,

HAYNES BEFFEL & WOLFELD LLP

Date: 24 July 2002

By: 

Mark A. Haynes, Reg. No. 30,846

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PATENT & TRADEMARK OFFICE

INFORMATION DISCLOSURE CITATION PTO-1449			Atty. Docket No. NMTI 1002-3		Serial No. 09/932,239	
			Applicant PIERRAT, Christophe		Filing Date 8/17/2001	
			Group 1754		Not Yet Assigned	
U.S. PATENT DOCUMENTS						
EXAMINER'S INITIALS	PATENT NO.	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	5,472,814	12/5/1995	Lin	430	5	11/17/1994
	5,923,562	7/13/1999	Liebmann, et al.	364	488	10/18/1996
	6,130,012	10/10/2000	May, et al.	430	5	1/13/1999
	6,139,994	10/31/2000	Broeke, et al.	430	5	6/25/1999
	6,185,727 B1	2/6/2001	Liebmann	716	19	12/12/1995
	6,335,128 B1	1/1/2002	Cobb, et al.	430	5	9/28/1999
	6,338,922 B1	1/15/2002	Liebmann, et al.	430	5	5/8/2000
	2001/0000240 A1	4/12/2001	Wang, et al.	430	5	12/7/2000
	2001/0028985 A1	10/11/2001	Wang, et al.	430	5	4/20/2001

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	Applicant	
	PIERRAT, Christophe	
	Filing Date	Group
	8/17/2001	1754 Not Yet Assigned

FOREIGN PATENT DOCUMENTS

EXAMINER'S INITIALS	PATENT NO.	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
						YES	NO
	WO 01/23961 A1	4/5/2001	WO			<input type="checkbox"/>	<input type="checkbox"/>
	WO 02/03140 A1	1/10/2002	WO			<input type="checkbox"/>	<input type="checkbox"/>
	JP 2-140743	5/30/1990	JP			<input checked="" type="checkbox"/>	<input type="checkbox"/>
	GB 2,333,613 A	7/28/1999	GB			<input type="checkbox"/>	<input type="checkbox"/>
	WO 98/12605 A1	3/26/1998	WO			<input type="checkbox"/>	<input type="checkbox"/>

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	8/17/2001	1756 Not Yet Assigned

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

EXAMINER'S INITIALS	CITATION
	<u>Polarized</u>
	Wang, R., et al., "Polarized Phase Shift Mask: Concept, Design, and Potential Advantages to Photolithography Process and Physical Design", Motorola Semiconductor Product Sector (12 pages).
	Ogawa, K., et al., "Phase Defect Inspection by Differential Interference", Lasertec Corporation (12 pages).
	Pistor, T., "Rigorous 3D Simulation of Phase Defects in Alternating Phase-Shifting Masks", Panoramic Technology Inc. (13 pages).
	Semmier, A., et al., "Application of 3D EMF Simulation for Development and Optimization of Alternating Phase Shifting Masks", Infineon Technologies AG (12 pages).
	Wong, A., et al., "Polarization Effects in Mask Transmission", University of California Berkeley (8 pages).
	Hirai, Y., et al., "Automatic Pattern Generation System for Phase Shifting Mask", 1991 Symposium on VLSI Technology, Digest of Technical Papers, pp. 95-96, May 28-30, 1991.
	Wong, A., et al., "Investigating Phase-Shifting Mask Layout Issues Using a Cad Toolkit", IEEE, pp. 27.4.1-27.4.4 (1991).
	Terasawa, T., et al., "Imaging Characteristics of Multi-Phase-Shifting and Halftone Phase-Shifting Masks", Japanese Journal of Applied Physics, Vol. 30, No. 11B, pp. 2991-2997, November 1991.
	Inoue, S., et al., "Simulation Study on Phase-Shifting Masks for Isolated Patterns", Japanese Journal of Applied Physics, Vol. 30, No. 11B, pp. 3010-3015, November 1991.
	Watanabe, H., et al., "Detection and Printability of Shifter Defects in Phase-Shifting Masks", Japanese Journal of Applied Physics, Vol. 30, No. 11B, pp. 3016-3020, November 1991.
	Watanabe, H., et al., "Pattern Transfer Characteristics of Transparent Phase Shifting Mask", Japanese Journal of Applied Physics, Vol. 30, No. 11B, pp. 3004-3009, November 1991.
	Moniwa, A., et al., "Algorithm for Phase-Shift Mask Design with Priority on Shifter Placement", Jpn. J. Appl. Phys., Vol. 32, Pt. 1, No. 12B, pp. 5874-5879, December 1993.
	Ooi, K., et al., "Computer Aided Design Software for Designing Phase-Shifting Masks", Jpn. J. Appl. Phys., Vol. 32, Pt. 1, No. 12B, pp. 5887-5891, December 1993.
	Ohtsuka, H., et al., "Evaluation of Repair Phase and Size Tolerance for a Phase-Shift Mask", J. Vac. Sci. Technol. B, Vol. 11, No. 6, pp. 2665-2668, November/December 1993.

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)		
EXAMINER'S INITIALS	CITATION	
	Moriwa, A., et al., "Heuristic Method for Phase-Conflict Minimization in Automatic Phase-Shift Mask Design", Jpn. J. Appl. Phys., Vol. 34, Pt. 1, No. 12B, pp. 6584-6589, December 1995.	
	Ohnuma, H., et al., "Lithography Computer Aided Design Technology for Embedded Memory in Logic", Jpn. J. Appl. Phys., Vol. 37, Part I, No. 12B, pp. 6686-6688, December 1998.	
	Kikuchi, K., et al., "Method of Expanding Process Window for the Double Exposure Technique with alt-PSMs", Optical Microlithography XIII, Proceeding of SPIE, Vol. 4000, pp. 121-131 (2000).	

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